Partner in Growing

User Manual

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Rotofill

Machine nr.: ……

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Preface

This user manual is written for anyone working on or with the machine. Before working on or with the machine, first read this manual.

This user manual contains important instructions / information on how to use the machine in a safe, professional and economical way and must always be available where the machine is used.

In addition to this user manual, the mandatory rules and regulations for accident prevention and environmental protection in the country and place of use of the machine must also be observed.

This user manual contains information on the operation of the machine with all the possible options. Use only the information that applies to your machine. Depending on the intensity of use and customer requirements, this machine can be equipped with various options. Contact your sales consultant.

Supplier details if not directly supplied by Javo BV. Dealer stamp:

Javo BV is not responsible for any errors in this manual or the consequences thereof.

Javo BV is not liable for damage or consequential damage caused by operating errors, lack of expert maintenance and any use other than described in this manual.

The liability of Javo BV also expires once modifications or additions are made without written permission of Javo BV.

This machine is suitable for process and environmental conditions as stated in section "Specifications and Tolerances" of this manual. Any other use is not authorized by Javo BV and this allows the operator and / or its environment at risk.

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1 Technical specifications and tolerances

This machine is intended to be used for filling trays automatically with substrate only. This machine is meant for processing trays, substrate and other materials that are described in this manual only. Detailed operation of the machine is described in section "Operation".

This machine may be used only within the limits for specifications and tolerances of the order, on the assembly drawing and indicated in this manual. If the machine is used outside these specifications, Javo BV can not take responsibility for this machine.

This machine is intended for products as agreed in the order confirmation only. To ensure the proper operation of this machine, only products with specifications and tolerances as specified in the order may be used.

Do not use the machine for purposes other than the intended purpose of Javo BV. This can lead to damage and danger to the operator and its environment.

This machine is CE marked. When placing multiple machines in one line, the entire line must be properly CE marked before using this machine. Untill proper CE Marking of the line is carried out, commissioning of this machine is prohibited.

Specifications	
Voltage	400Volt 50Hz 3~+N+ PE
Machine connection	16A 5pole
Power consumption	2,05kW (3kW max.)
Weight	±850kg
Height conveyor	945mm
Work direction	Right-hand version: The tray moves from left to right as seen from the bucket. Left-hand version: The tray moves from right to left as seen from the bucket.
Max. speed	563 m. p/h (depending on the tray type)
Min. speed	113 m. p/h (depending on the tray type)
Minimum passage height	30mm
Maximum passage height	140mm
Maximum tray width	400mm
Content substrate bin	845 Litre
Drive conveyor	Friction variator
Vibrator under tray belt	Directly driven by motor (as of February '10)
Year of construction	See type plate
Type product	As agreed in the order confirmation.

1.1 Type plate

The type plate is placed onto the main cabinet door.

2 Safety

This machine is built according the state of the art technique and the accredited safety regulations. Despite this, the body and life from the user or third parties can be in danger when using it. There could also arise damage to the machine or other goods when using it.

This machine is CE marked. When placing multiple machines in one line, the entire line must be properly CE marked before using this machine. Untill proper CE Marking of the line is carried out, commissioning of this machine is prohibited.

2.1 Provisions

1. Operation and maintenance of this machine must be performed by qualified personnel in compliance with warnings on the machine and in accordance with the user manual. Keep children and other (unauthorized) persons away while using machine.
2. This machine is suitable for process and environmental conditions as stated in section "Specifications and Tolerances" of this manual only. Any other use is not authorized by Javo BV and this allows the operator and / or the environment at risk.
3. It is prohibited to modify this machine, without prior written approval of Javo BV.
4. Thermal fuses and torque limiters may not be set different upon delivery of the new machine. The thermal circuit breakers should never be used to turn on / off the machine.
5. This machine should be installed so that there is sufficient space remaining for providing safe instructions and / or performing maintenance and / or inspections. Put the brakes on the castors before the machine is turned on.
6. Keep the work area clean and well lit. Cluttered or dark areas invite accidents.
7. This machine is not suitable to be used outside. Electrical components are only splashproof. Keep the machine away from rain and moisture. When using the machine in a humid environment is unavoidable, you should use an RCD.
8. Keep hands, hair, loose clothing and / or jewelry away from moving parts of the machine. Wear appropriate clothing without loose parts. Wear non-slip work shoes.
9. As long as the machine is on, no connection or safety devices may be removed. The machine may only be used when all protective devices and safety-related facilities are available and ready for use.
10. Do not stand on the machine when it is operating.
11. Never move the machine if the power cable and / or pneumatic supply is still connected.
12. Prescribed checks and maintenance in the user manual must be observed.
13. Allow the machine to be serviced and repaired by qualified personell only with original replacement parts.
14. In addition to the user manual, generally applicable statutory and other regulations regarding accident prevention and environmental protection have to be respected. This is also referred to handling of personal protective equipment.
15. Inform operating personnel before start maintenance. Interrupt if possible the power (mains), before start machine investigation or maintenance by turning off the main switch and locking the main switch. Pull the plug from the wall socket.
    a. As work must be done with power supply (mains) voltage on the machine, then arrange an additional person who can operate the emergency stop.
16. When a machine part is damaged or not working in the prescribed manner, the work must be interrupted immediately. Resumption allowed only when the machine part is repaired or replaced and checked. Consult your dealer if the machine is not functioning properly.
17. Machine and / or parts must be disposed in accordance with local laws and regulations.

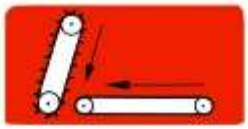
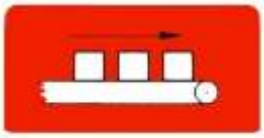
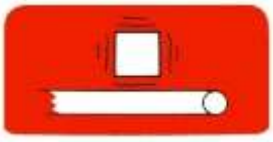
2.2 Safety devices on the machine

Caps and doors are screening moving parts. Always place back caps and close doors before the machine is turned on. Caps and doors should remain closed while operating the machine.

The motors of the machine are protected against overload by thermal switches. These switches are located in the control box.

2.3 Explanation of icons and symbols

Pictogram	Meaning
	Read and understand this manual before using the machine and / or performing maintenance.
	Remove Power (mains).
	Wear during all work on or with the machine safety shoes and safety glasses.
	Wear during cleaning and maintenance work on this machine also safety gloves and protective clothing.
	Warning. Important points and / or instructions regarding safety and / or injury prevention are marked with this warning sign.
	Dangerous electrical voltage. Dangerous electrical voltage present.
	Risk of crushing. Danger of moving or rotating parts.
	It is forbidden to wear Loose clothing, long hair and / or jewelry nearby moving parts of the machine.
	Trespassing.
	Do not rinse control cabinet Danger of moisture in the cabinet when it is rinsed with water.

Symbols that may be present on this machine			
Drill	Direction of movement	Speed ground feeder (curved)	Speed ground feeder (straight)
Elevator standard 	Elevator SE	Pot	Tray belt Rotofill 
Speed pot belt (curved)	Speed pot belt (straight)	Brush disc Rotofill	Rotor Rotofill 

3 Description of the manchine

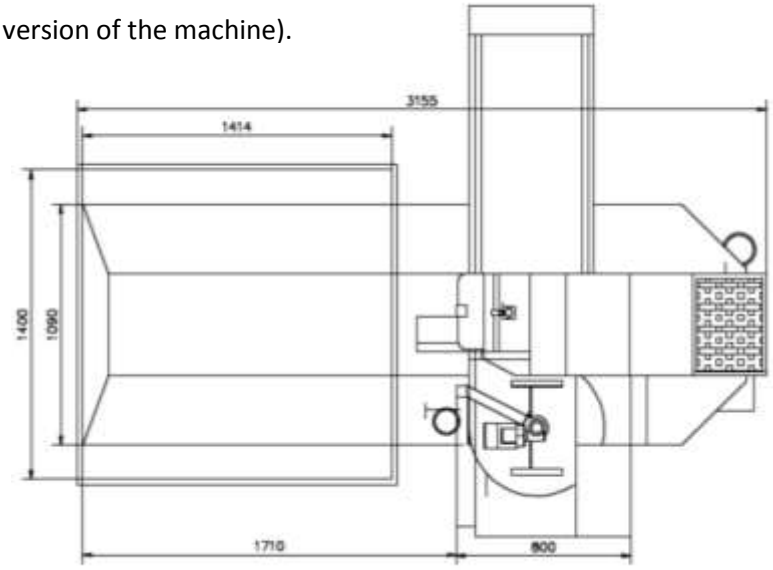
3.1 Machine overview

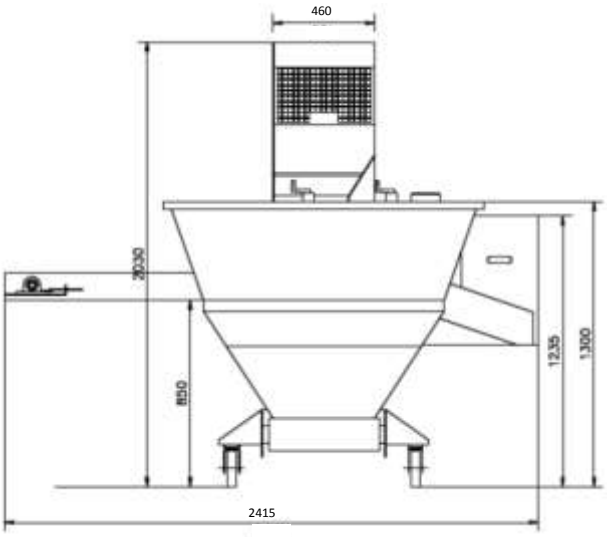
A. Substrate bin
B. Elevator *
C. Exit trays *
D. Entrance trays
E. Brush disc unit*
F. Substrate retour chain

* Moving parts of the machine are protected by hoods and doors when the machine was delivered.

3.2 Outline drawing with main dimensions

(drawing is a right-hand version of the machine).





3.3 Options

Depending on the intensity of use and customer requirements, this machine can be equipped with various options. Contact your sales consultant.

Options	Code	Specifications
4 meter 5x1.5 cable incl. 16A plug	900965	
Continuous socket	900966	Nonstandard
Switched Socket		1x 16A 5 pole
Substrate bin 1400x1400	212-264	753 Litre (t.b.v. original bin)
Tray guide 1 side	RFO1	2x bracket, 1x guide
Tray guide 2 sides	RFO2	4x bracket, 2x guide
Press on role		Instead of rotor above the tray
Height increasing set for tray throughput	RFOT	Height transit 200mm (80mm minimum height)
Variator on conveyor	212-130 E	Minimum speed of 0 m/sec possible
Stainless steel slide plate	212-142	
Air wheels incl. triangle back	SU1ZL	Wheels protrude outside the machine
Air wheels front	SU1L	
Conveyor suspension	212-154	Is adjustable in width to 400mm
Substrate slide in substrate stock	212-270	
Stainless steel substrate retour chain	212-001481	Stainless steel with 10 pushers

Options:

- Transport conveyor

3.4 Operation

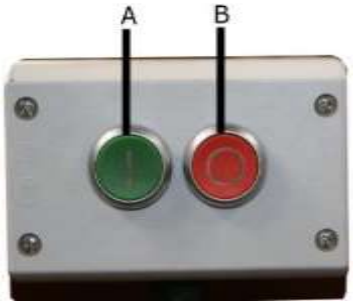
The process of the machine begins at the soil bin, which is filled with substrate. Substrate is transported with the substrate conveyor to the elevator. The elevator transports substrate to the rotor.
The rotor divides substrate evenly over the full width of the tray, in the cells of the tray. An equal amount of substrate is divided in all the tray cells.
A vibrator is mounted under the conveyor. As a result, the substrate in the tray is divided more evenly. The remaining substrate is returned through the ground retour chain.
The filled tray is transported and passes a substrate slide. At the substrate slide, the excess substrate is removed from the tray. The tray is then evenly leveled by the brush unit.
The machine is equipped with wheels, which makes the machine easy to move.

3.5 Machine workstations

This machine has two operator places; at the conveyor belt, both the inlet and the outlet on the side of the substrate bin.

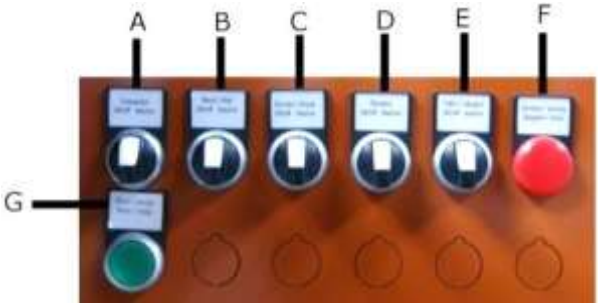
3.6 Controls

The motor is controlled with the control panel. This control panel is flexible around the machine to be used by means of a cable. The control panel consists of the following buttons;



A. Start button
B. Stop button

At the electrical cabinet of the machine, these buttons and connectors are placed:



A.	Compactor	off / on
B.	Belt	off / on
C.	Brush	off / on
D.	Elevator	off / on
E.	Vibrator	off / on
F.	Stopped	error
G.	Reset	reset
H.	Main switch	

The machine is equipped with emergency stop buttons:

I. Emergency stop button

4 Transport

Follow all instructions described in this manual, in particular chapter safety.

On delivery of the machine, a Javo mechanical engineer must be present to unload the machine from the (freight) wagon.

Prior to moving the machine, the power should be disconnected. Make sure the cables are stowed sufficiently.

When moving within the company (when the machine does not need to be lifted) the state of the machine should be checked. Make sure the path to be traveled is free, so the machine can be moved to the desired position without obstacles.

If the machine is to be lifted for movement (outside the company), please contact your dealer or contact a professional shipping company.

Before the machine can be moved, the conveyor belt must be removed.
The machine must be transported upright.

The relative humidity should not be too high so that water condenses in the machine.

Report damage during or immediately after delivery to the transport company and to Javo BV. Take all necessary steps to prevent further damage.

5 Mounting, installation and commissioning

Follow all instructions described in this manual, in particular chapter safety.

This machine is CE marked. When placing multiple machines in one line, the entire line must be properly CE marked before using this machine. Up to CE Marking of the line, commissioning of this machine is prohibited.

5.1 Placement

The machine must be placed on a flat surface, with sufficient weight capacity. Install the machine so that there is enough space left for service providing, safe instructions and / or cleaning, maintenance and / or inspections. Put the brakes on the castors before the machine is turned on.

This machine is not suitable to be used in the open air. Electrical components are only splashproof. Keep the machine away from rain and moisture. When using the machine in a humid location is unavoidable, you should use an RCD.

5.2 Facilities to take care of by the user

Prior to delivery of the machine, the required materials and facilities (air, power, substrate, etc.) needs to be present within 3 meters of machine.

Required power supply: 400 Volt, 3 Phase + Neutral + Earth. (N. America: 208/220V 60Hz.).

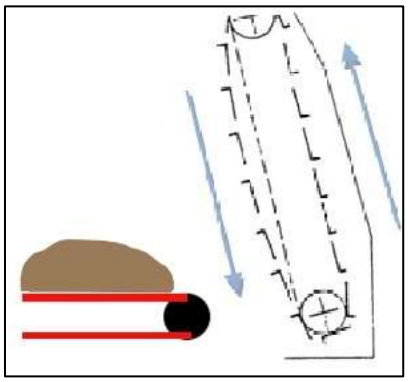
5.3 Mounting / Connecting

If applicable, the components supplied are to be mounted on the machine. Make sure that the moving parts are free. If the machine is complete, it can be connected (by a competent person) to the power supply.

Keep hands, hair, loose clothing and / or jewellery away from moving parts of the machine. Wear appropriate clothing without loose parts. Wear non-slip work shoes.

As long as the machine is on, no connection or safety devices may be removed. The machine may only be used when all protective devices and safety-related facilities are available and ready for use.

5.4 Check rotation direction

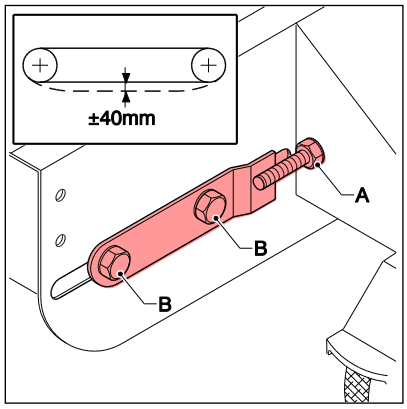


Check the rotation direction of the elevator before you start working with the machine.

Procedure:

1. Connect the power cable.
2. Start the elevator.
    a. Turn off the main switch.
    b. Press the reset button emergency stop circuit.
    c. Start the elevator with the elevator button.
3. Check the direction of rotation of the elevator.
4. Stop the elevator by turning the main switch off.
5. When rotation direction is incorrect:
    a. Remove the plug from the socket.
    b. Open the plug and switch 2 of the 3 phases in the plug. This should only be carried out by suitably qualified personnel.

5.5 Check substrate conveyor tension



Check the substrate conveyor belt tension before you start working with the machine.

Procedure:

1. Check the substrate conveyor belt tension. The correct tension is obtained when the belt in the middle deflects ± 40mm.
2. Adjust the belt tension if necessary .
    a. Loosen the four screws (B) to the block bearings.
    b. The tension can be adjusted by simultaneously turning both sides of the ground belt (A).
    c. Tighten the four screws (B) to the block bearings.

5.6 Check elevator chain tension

Check the elevator chain tension before you start working with the machine.

Procedure:

1. Check the elevator chain tension. The correct tension is obtained when the chain in the middle deflects ± 40mm.
2. Adjust the chain tension if necessary .
    a. The tension can be adjusted using the two clamping nuts, located on opposite sides of the elevator housing.
    b. Tighten the nuts (A) on both sides of the elevator equally.

The tension of the chain should not be too tight.

5.7 Check substrate retour chain tension

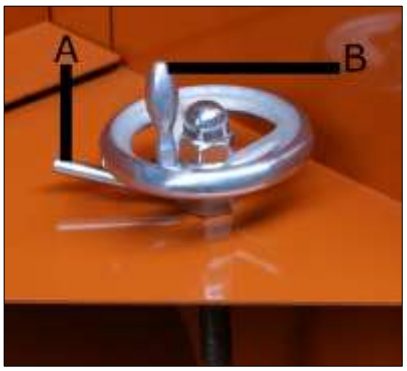
Check the substrate retour chain tension before you start working with the machine.

Procedure:

1. Check the substrate retour chain tension. The correct tension is obtained when the chain is reaching the bottom plate in the middle.
2. Adjust the chain tension if necessary .

5.8 Set substrate conveyor speed

Set the substrate conveyor speed before you start working with the machine.

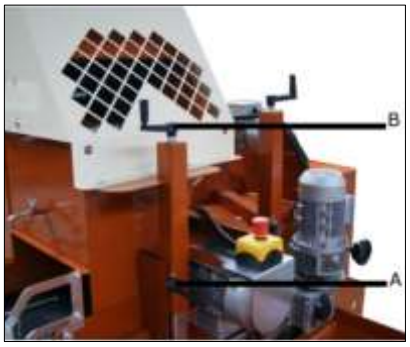


Procedure:

1. Check the substrate conveyor speed. Set the speed in this way that trays are being filled sufficiently before they reach the substrate slide.
2. When the speed needs to be adjusted:
    a. Loosen locking bar (A).
    b. Turn wheel (B):
        i. CCW = substrate conveyor will run slower.
        ii. Clockwise = the speed of the conveyor is increased.
    c. Tighten locking bar (A).

5.9 Set compactor height

Set the compactor height before you start working with the machine.



Procedure:

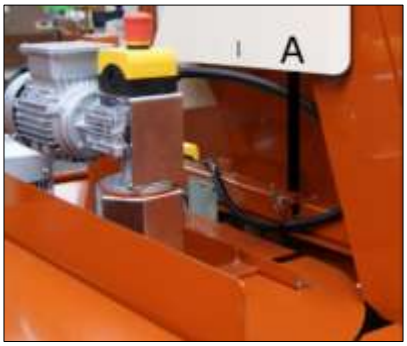
1. Check the compactor height with respect to the tray.

The compactor should not touch the tray. There should be a gap of about 10mm.

2. If the height is incorrect:
    a. Loosen clamp (A).
    b. Turn the compactor to the desired height with crank (B).
        i. The lower the compactor is over the tray, the harder the ground tension will be.
        ii. The higher the compactor is over the tray the softer the ground tension will be.
    c. Tighten clamp (A).

5.10 Set substrate slide height

The substrate slide is placed after the compactor. The substrate slide has the function to shift the excess of substrate off the tray.

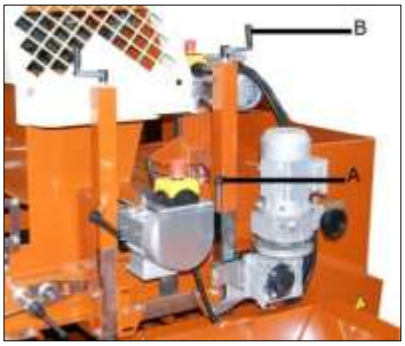


Set the position of the substrate slide before you start working with the machine.

Procedure:

1. Check the height of the substrate slide with respect to the tray. The slide should be placed approximately 15mm above the tray.
2. If the height is incorrect:
    a. Loosen wing nut (A).
    b. Set the substrate slide to the desired height.
    c. Tighten wing nut (A).

5.11 Set brush height



Set the brush height before you start working with the machine.

Procedure:

1. Check the height of the brush with respect to the tray. The slide should be placed approximately 5mm above the tray. The brush is intended to evenly level the substrate in the tray.
2. If the height is incorrect:
    a. Loosen clamp (A).
    b. Set the desired height using crank (B).
    c. Tighten clamp(A).

5.12 Set speed tray conveyor and ground retour chain

The tray conveyor and ground retour chain is driven by one electric motor. Both drive ratios are 1 to 1, which means that the speed of the tray conveyor and the substrate retour chain is the same.

Set the tray conveyor and ground retour chain speed before you start working with the machine.

Procedure:

1. Check the speed of the tray conveyor and substrate retour chain.
2. Set the desired speed by turning Vario clutch (A) to the left or right.

5.13 Set vibrator

The vibrator is mounted in order to ensure that the ground in a high tray, is lowered well in the bottom of the tray.

Set the vibration intensity before you start working with the machine.

Procedure:

1. Check the intensity of vibration.
2. If the vibration is incorrect:
    a. Loosen clamp (A).
    b. Turn rod (B) left or right.
        i. The vibration is intense when the rod is up. When the rod is down, the vibration is the least.
    c. Tighten clamp (A).

5.14 Set substrate deflectors at the elevator

The elevator transports substrate up and pour it over the compactor. The substrate that is deposited, is to send over two substrate deflectors.

Set the substrate deflectors before you start working with the machine.

Procedure:

1. Verify the distribution of substrate in the tray.
2. If the distribution is incorrect:
    a. Loosen deflector (A).
    b. Push the substrate deflector forwards or backwards.
    c. Tighten deflector (A).

Deflector (B) is often used for soft / weak trays. The reason for this is that substratemay bend weak trays and so manufacturing problems may arise.

    d. Loosen deflector (B) with wing nuts (C).
    e. Slide pin (B) forward or backward.
    f. Tighten deflector (B) with wing nuts (C).

6 Operation

Follow all instructions described in this manual, in particular chapter safety.

Keep hands, hair, loose clothing and / or jewelry away from moving parts of the machine. Wear appropriate clothing without loose parts. Wear non-slip work shoes.

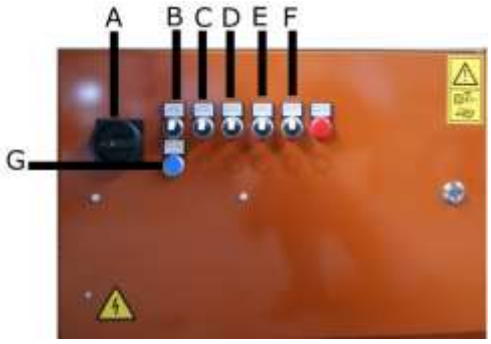
As long as the machine is on, no connection or safety devices may be removed. The machine may only be used when all protective devices and safety-related facilities are available and ready for use.

If a machine part is damaged or not working in the prescribed manner, work must be interrupted immediately. Resumption allowed only when the machine part is repaired or replaced and checked. Consult your dealer if the machine is not functioning properly.

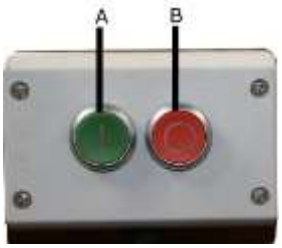
6.1 Start

Start procedure:

1. Turn on the main power at the electrical cabinet.
2. Turn on the compactor, conveyor, brush unit, elevator and vibrator with switches (B+C+D+E+F) at the electrical cabinet.
3. Press the blue reset button (G).



4. Press the green button (A) on the control panel to start the machine.



6.2 Stop

Stop procedure:

1. Press the red stop button (B) on the control panel.

6.3 Emergency stop

Emergency stop procedure:

1. Press the red emergency stop button on the machine to activate the emergency stop.

Restart after emergency stop procedure:

1. Ensure that the cause of the emergency is resolved.
2. Close all doors and covers.
3. Pull the red emergency stop button to reset.
4. Press the reset button.
5. Press the green button on the control panel to start the machine.

7 Maintenance

Follow all instructions described in this manual, in particular chapter safety.

Maintenance of this machine must be performed in compliance with warnings on the machine and in accordance with the user manual by qualified personnel.

Keep hands, hair, loose clothing and / or jewelry away from moving parts of the machine. Wear appropriate clothing without loose parts. Wear non-slip work shoes.

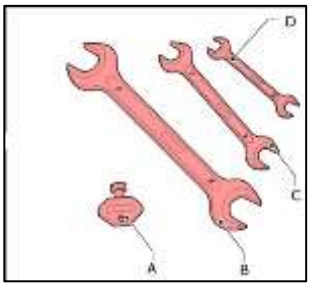
As long as the machine is on, no connection or safety devices may be removed. The machine may only be used when all protective devices and safety-related facilities are available and ready for use.

Always unplug the plug from the socket before starting maintenance. Wear personal protective equipment (see section 2.3).

Inform operating personnel before start maintenance. Interrupt if possible the power (mains), before the machine is investigated or maintained by turning off the main switch and locking it and pull the plug from the socket. If work must be done with power supply (mains) voltage on the machine, work with an additional person who can operate the emergency stop.

7.1 Required tools and equipment

A set of keys is included with the machine, consisting of:



A. Door key
B. Spanner 24-27mm
C. Spanner 17-19mm
D. Spanner 10-13mm

7.2 Preventive Maintenance

For the following maintenance instructions normal use is considered. With heavy use, or use under extreme conditions, maintenance should be performed at shorter intervals.

Item	1x per...	Comments
Machine	Day	Check if moving parts are functioning correctly and not clamping and / or parts are broken or damaged in such a way that the operation is adversely affected. Have damaged parts repaired before use.
Substrate retour chain	Day	Cleaning. See section “Substrate retour chain cleaning”.
Elevator and belts	Day	Check tension. See section “Mounting, installation and commisioning”.
Materials in the machine	Day	Remove trays or other material that has fallen into the machine before starting the machine.
Safety components	Week	Test the safety circuit. See section “Test safety circuit”.
Pictograms	Week	Check readability and replace if necessary.
Elevator	160 hour	Cleaning. See section “Elevator cleaning”.
Bearings	320 hour	Grease bearings of the conveyor. See section “Greasing bearings conveyor”.
Electrical installation	Year	Check for damage.
Electric motors	Year	Remove dust.

7.3 Substrate retour chain cleaning

The substrate retour chain must be cleaned after daily use.

Procedure:

1. Spray the chain and sprockets thoroughly with compressed air. Make sure there is no substrate remaining on the sprockets and chain. With proper maintenance, the life of both the chain and the sprockets extends.
2. When the machine is stopped for longer than a few days, the chain should be sprayed with Teflon spray to keep the chain smooth.

7.4 Elevator cleaning

The blades of the elevator must be cleaned regularly in order to prevent excessive wear.

Procedure:

1. Loosen the two guards (A + B) of the elevator, using the supplied door key and remove it from the machine.
2. Spray the blades of the elevator (C) and the elevator chain with compressed air.
3. Attach the two guards (A + B) of the elevator, using the supplied key, on the machine.

7.5 Test safety circuit

Procedure:

1. Start the machine.
2. Press the emergency stop button. The machine is now disabled.
3. Pull the Emergency Stop button. The machine remains off.
4. Press the reset button emergency stop circuit. All possibly connected conveyors start moving.
5. Start the machine

The machine must not be used when going through the above process, the machine responds differently than described above. Warn directly Javo BV.

7.6 Greasing bearings conveyor

The tray-conveyor belt (A) is mounted with block bearings. The block bearings (B) must be lubricated after every 320 hours of operation using a grease gun.

7.7 Fault list

Problem	Possible cause	Action / Solution
Motor fault	mains voltage deviates more than 10% of the rated motor voltage	Provide the correct voltage
	Too high cooling air temperature	Provide cool air
	Poor cable connection	check the cable connection and repair if necessary
	Blown fuse	Replace fuse
	Too little cooling air caused by a clogged cooling air passage	Ensure proper inlet and outlet of the cooling air
The motor hums and takes too much power	Defect winding	Repair or replace the motor winding
	Loose wire	Lock wire
Fuses are blown	Short circuit in wiring or motor	Rectify the short circuit
	Motor short circuit to housing or has a short in the windings	Turn to a repair shop to fix the short circuit
	Motor is connected incorrectly	Connect the motor correct
Minimum substrate in the trays	Too little substrate in the bin	Fill the bin with substrate
	Elevator provides little substrate	Set the substrate conveyor faster
Machine does not start	Door safety switch is open	Close door and reset the safety circuit by pressing the reset button
	Emergency stop button is not pulled	Pull Emergency Stop button and reset the safety circuit by pressing the reset button
	Emergency stop button not reset	Reset the safety circuit by pressing the reset button
	Breaker tripped in main cabinet	See why circuit breaker has tripped. Remove obstacles to conveyors. Switch on the machine after solving the problem.
	Cable length too large causing voltage loss	Reduce cable length
	Voltage fluctuations caused by other devices on the same group	Ensure the correct voltage. Turn off other devices

7.8 Drawings and schemes

The drawings accompanying this machine are supplied in a separate file. The wiring diagrams are included in the electrical cabinet of the machine.

7.9 Spare parts

Only original spare parts and accessories of Javo BV may be used on the machine.

Javo BV advises you to take certain parts in stock because of wear sensitivity and / or any expected downtime for re-ordering of the parts.

The spare parts list can be found on the assembly drawings. These can be found on JavoNet.

When ordering (spare) parts at Javo BV, the following information must be included: drawing number, item number, desired length (if applicable) and the desired number of pieces.

7.10 JavoNet

We recommend you to register your machine on JavoNet. This way you get online access to all technical drawings and documents pertaining to your machine.
Visit our website (www.javo.eu) for more information and to request an account.

7.11 Customer support and advice

Our technical department will answer your other questions about repair and maintenance of your machine and spare parts. We can help you with any questions regarding the purchase, use and settings of products and accessories.

8 Disposal of machine or machine parts

Follow all instructions described in this manual, in particular chapter safety.

Perform the following steps when disposing the machine:

1. Decommission the machine and remove electric and pneumatic power.
2. Drain and remove all consumables.
3. Scrap the machine according to the local legislation.

9 EG-conformity statement

EG-conformity statement for machines (directive 2006/42/EG, annex II, under A.)

CE

Javo BV
Westeinde 4
2211XP Noordwijkerhout
The Netherlands

Declares that:

Machine: ***Rotofill***
Type: ***Rotofill***
Serial number: ***...***

is in accordance with the **Machine directive 2006/42/EG** and complies with the provisions of the **EMC-directive 2004/108/EEG**

Complies with the harmonized European Standards:

Harmonized European standard	**definition**	**Harmonized European standard**	**definition**
NEN-EN-ISO 12100:2010	Safety of machinery - Basic concepts, general principles for design - Part 1: Basic terminology, methodology	NPR-ISO/TR 14121-2:2010	Safety of machinery - Risk assessment - Part 2: Practical guidance and examples of methods
NEN-EN-ISO 13857	Safety of machinery - Safety distances to prevent hazard zones being reached by the upper and lower limbs	NEN-EN-ISO 13849-1	Safety of machinery - Parts of Control Systems with a safety function - Part 1: General principles for design
NEN-EN-IEC 60204-1	Safety of machinery - Electrical equipment of machines - Part 1: General requirements	NEN-EN 13850	Safety of machinery - Emergency stop - Principles for design

The Netherlands, Noordwijkerhout,
April 2014

Cees Bouwmeester
Director